

Please provide the following information, and submit to the NOAA DM Plan Repository.

Reference to Master DM Plan (if applicable)

As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

1. General Description of Data to be Managed**1.1. Name of the Data, data collection Project, or data-producing Program:**

2018 USGS Lidar: Ottawa NF, MI

1.2. Summary description of the data:

Product: This lidar data set includes classified LAS 1.4 files, with unclassified (1), ground (2), low vegetation (3), medium vegetation (4), high vegetation (5), building (6), noise (7), water (9), ignored ground (10), withheld (11), and bridge (17).

Geographic Extent: Four counties in Michigan, covering approximately 2,563 total square miles.

Dataset Description: The Ottawa National Forest, MI, 2017 LiDAR project called for the planning, acquisition, processing, and derivative products of lidar data to be collected at a nominal pulse spacing (NPS) of 0.7 meters. Project specifications are based on the U.S. Geological Survey National Geospatial Program Base LiDAR Specification, Version 1.2. The data were developed based on a horizontal projection/datum of NAD83 (2011), State Plane Michigan North FIPS 2111, Intl feet and vertical datum of NAVD88 (GEOID12B), Intl feet. LiDAR data were delivered as processed Classified LAS 1.4 files formatted to 11,799 individual 2,500 feet x 2,500 feet tiles, as tiled intensity imagery, and as tiled bare earth DEMs; all tiled to the same 2,500 feet x 2,500 feet schema. Continuous breaklines were produced in Esri file geodatabase format.

Ground Conditions: LiDAR was collected in spring of 2018, while no snow was on the ground and rivers were at or below normal levels. In order to post process the LiDAR data to meet task order specifications and meet ASPRS vertical accuracy guidelines, Quantum Spatial, Inc. utilized a total of 59 ground control points that were used to calibrate the LiDAR to known ground locations established throughout the project area. An additional 143 independent accuracy checkpoints, 81 in Bare Earth and Urban landcovers (81 NVA points), 62 in Tall Weeds categories (62 VVA points), were used to assess the vertical accuracy of the data. These checkpoints were not used to calibrate or post process the data.

Tiled and mosaicked hydro-flattened bare-earth DEMs, continuous breaklines, and tiled

and mosaicked intensity imagery are available from USGS National Map.

1.3. Is this a one-time data collection, or an ongoing series of measurements?

One-time data collection

1.4. Actual or planned temporal coverage of the data:

2018-05-15 to 2018-10-24

1.5. Actual or planned geographic coverage of the data:

W: -90.24306067, E: -88.6095749, N: 46.77110143, S: 46.01211535

1.6. Type(s) of data:

(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)

Model (digital)

1.7. Data collection method(s):

(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)

1.8. If data are from a NOAA Observing System of Record, indicate name of system:

1.8.1. If data are from another observing system, please specify:

2. Point of Contact for this Data Management Plan (author or maintainer)

2.1. Name:

NOAA Office for Coastal Management (NOAA/OCM)

2.2. Title:

Metadata Contact

2.3. Affiliation or facility:

NOAA Office for Coastal Management (NOAA/OCM)

2.4. E-mail address:

coastal.info@noaa.gov

2.5. Phone number:

(843) 740-1202

3. Responsible Party for Data Management

Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.

3.1. Name:

3.2. Title:

Data Steward

4. Resources

Programs must identify resources within their own budget for managing the data they produce.

4.1. Have resources for management of these data been identified?

Yes

4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):

Unknown

5. Data Lineage and Quality

NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.

5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

(describe or provide URL of description):

Process Steps:

- 2018-01-01 00:00:00 - Raw Data and Boresight Processing: The boresight for each lift was done individually as the solution may change slightly from lift to lift. The following steps describe the Raw Data Processing and Boresight process: 1) Technicians processed the raw data to LAS format flight lines using the final GPS/IMU solution. This LAS data set was used as source data for boresight. 2) Technicians first used Quantum Spatial, Inc. proprietary and commercial software to calculate initial boresight adjustment angles based on sample areas selected in the lift. These areas cover calibration flight lines collected in the lift, cross tie, and production flight lines. These areas are well distributed in the lift coverage and cover multiple terrain types that are necessary for boresight angle calculation. The technician then analyzed the results and made any necessary additional adjustment until it was acceptable for the selected areas. 3) Once the boresight angle calculation was completed for the selected areas, the adjusted settings were applied to all of the flight lines of the lift and checked for consistency. The technicians utilized commercial and proprietary software packages to analyze how well flight line overlaps matched for the entire lift and adjusted as necessary until the results met the project specifications. 4) Once all lifts were completed with individual boresight adjustment, the technicians checked and corrected the vertical misalignment of all flight lines and also the matching between data and ground truth. The relative accuracy was less than or equal to 7 cm RMSEz within individual swaths and less than or equal to 10 cm RMSEz or within swath overlap (between adjacent swaths). 5) The technicians ran a final vertical accuracy check of the boresighted flight lines against the surveyed checkpoints after the z correction to ensure the requirement of NVA = 19.6 cm 95% Confidence Level (Required Accuracy) was met.
- 2018-01-01 00:00:00 - LAS Point Classification: The point classification was

performed as described below. The bare earth surface was manually reviewed to ensure correct classification on the Class 2 (Ground) points. After the bare-earth surface was finalized, it was then used to generate all hydro-breaklines through heads-up digitization. All ground (ASPRS Class 2) LiDAR data inside of the Lake Pond and Double Line Drain hydro-flattened breaklines were then classified to Water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 1 meter was also used around each hydro-flattened feature to classify these ground (ASPRS Class 2) points to Ignored ground (ASPRS Class 10). All Lake Pond Island and Double Line Drain Island features were checked to ensure that the ground (ASPRS Class 2) points were reclassified to the correct classification after the automated classification was completed. All overlap data was processed through automated functionality provided by TerraScan to classify the overlapping flight line data to approved classes by USGS. The overlap data was classified using standard LAS overlap bit. These classes were created through automated processes only and were not verified for classification accuracy. Due to software limitations within TerraScan, these classes were used to trip the withheld bit within various software packages. These processes were reviewed and accepted by USGS through numerous conference calls and pilot study areas. All data were manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler. Global Mapper was used as a final check of the bare earth dataset. GeoCue was then used to create the deliverable industry-standard LAS files for both the All Point Cloud Data and the Bare Earth. Quantum Spatial, Inc. proprietary software was used to perform final statistical analysis of the classes in the LAS files, on a per tile level to verify final classification metrics and full LAS header information.

- 2018-01-01 00:00:00 - Hydro-Flattened Breakline Processing: Class 2 (ground) LiDAR points were used to create a bare earth surface model. The surface model was then used to heads-up digitize 2D breaklines of inland streams and rivers with a 100-foot nominal width and inland ponds and lakes of 2 acres or greater surface area. Elevation values were assigned to all Inland Ponds and Lakes, Inland Pond and Lake Islands, Inland Stream and River Islands, using TerraModeler functionality. Elevation values were assigned to all inland streams and rivers using Quantum Spatial, Inc. proprietary software. All Ground (ASPRS Class 2) LiDAR data inside of the collected inland breaklines were then classified to Water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 1 meter was also used around each hydro-flattened feature. These points were moved from ground (ASPRS Class 2) to Ignored Ground (ASPRS Class 10). The breakline files were then translated to Esri file geodatabase format using Esri conversion tools. Breaklines were reviewed against LiDAR intensity imagery to verify completeness of capture. All breaklines were then compared to TINs (triangular irregular networks) created from ground only points prior to water classification. The horizontal placement of breaklines was compared to terrain features and the breakline elevations were compared to LiDAR elevations to ensure all breaklines matched the LiDAR within acceptable tolerances. Some deviation was expected between breakline and LiDAR elevations

due to monotonicity, connectivity, and flattening rules that were enforced on the breaklines. Once completeness, horizontal placement, and vertical variance were reviewed, all breaklines were reviewed for topological consistency and data integrity using a combination of Esri Data Reviewer tools and proprietary tools.

- 2018-01-01 00:00:00 - Hydro-Flattened Raster DEM Processing: Class 2 (Ground) LiDAR points in conjunction with the hydro-breaklines were used to create a 2.5-foot hydro-flattened raster DEM. Using automated scripting routines within ArcMap, an ERDAS Imagine .IMG file was created for each tile. Each surface was reviewed using Global Mapper to check for any surface anomalies or incorrect elevations found within the surface.

- 2018-01-01 00:00:00 - Intensity Image Generation Processing: GeoCue software was used to create the deliverable intensity images. All overlap classes were ignored during this process. This helps to ensure a more aesthetically pleasing image. The GeoCue software was then used to verify full project coverage as well. TIF/TWF files were then provided as the deliverable for this dataset requirement.

- 2018-01-01 00:00:00 - Tile Index Processing: Tiles were created using a 0,0 origin point to ensure proper divisibility of raster and image cells. A 2,500 feet x 2,500 feet tile size was used as called for in the Task Order. Tile index was output in Esri shapefile format. Tile names are derived from the US National Grid.

- 2018-01-01 00:00:00 - QC Checkpoint Processing: Please see the survey report for more information on control point location methodologies. The QC checkpoint shapefiles were generated from XYZ text files using a combination of Global Mapper and ArcMap software.

- 2018-01-01 00:00:00 - Processing Boundary Processing: The processing boundary was created using the original client-provided AOI shapefile. The original file was buffered by 100 meters in order to meet task order requirements for data coverage.

- 2018-01-01 00:00:00 - Calibration Point Processing: Please see the survey report for more information on control point location methodologies. The calibration control point shapefiles were generated from XYZ text files using a combination of Global Mapper and ArcMap software.

- NOAA OCM downloaded 11800 laz files from the USGS rockyftp site. The files were in Michigan State Plane North projection NAD83(2011) and NAVD88 geoid12b, with all units in feet. OCM processed the files to the Digital Coast using internal scripts. For provisioning purposes the files were converted to geographic projection and ellipsoidal heights by reversing the application of geoid12b, with units in meters.

5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:

5.2. Quality control procedures employed (describe or provide URL of description):

6. Data Documentation

The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.

6.1. Does metadata comply with EDMC Data Documentation directive?

No

6.1.1. If metadata are non-existent or non-compliant, please explain:

Missing/invalid information:

- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 5.2. Quality control procedures employed
- 7.1.1. If data are not available or has limitations, has a Waiver been filed?
- 7.4. Approximate delay between data collection and dissemination
- 8.3. Approximate delay between data collection and submission to an archive facility

6.2. Name of organization or facility providing metadata hosting:

NMFS Office of Science and Technology

6.2.1. If service is needed for metadata hosting, please indicate:

6.3. URL of metadata folder or data catalog, if known:

<https://www.fisheries.noaa.gov/inport/item/58790>

6.4. Process for producing and maintaining metadata

(describe or provide URL of description):

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive: https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf

7. Data Access

NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.

7.1. Do these data comply with the Data Access directive?

Yes

7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?

7.1.2. If there are limitations to public data access, describe how data are protected

from unauthorized access or disclosure:

7.2. Name of organization of facility providing data access:

NOAA Office for Coastal Management (NOAA/OCM)

7.2.1. If data hosting service is needed, please indicate:

7.2.2. URL of data access service, if known:

<https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=9013>

https://coast.noaa.gov/htdata/lidar3_z/geoid18/data/9013

7.3. Data access methods or services offered:

Data is available online for bulk or custom downloads

7.4. Approximate delay between data collection and dissemination:

7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:

8. Data Preservation and Protection

The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.

8.1. Actual or planned long-term data archive location:

(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)

NCEI_CO

8.1.1. If World Data Center or Other, specify:

8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:

8.2. Data storage facility prior to being sent to an archive facility (if any):

Office for Coastal Management - Charleston, SC

8.3. Approximate delay between data collection and submission to an archive facility:

8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection

Data is backed up to tape and to cloud storage.

9. Additional Line Office or Staff Office Questions

Line and Staff Offices may extend this template by inserting additional questions in this section.